# Proposed Table of Contents – TRB Higwhay Safety Manual April-June 2003

## **Proposed HSM Structure**

#### Part I – Introduction and Fundamentals

Chapter 1. Introduction and Overview

- 1.1 Purpose
- 1.2 Background on the Need for HSM
- 1.3 Scope of the HSM
- 1.4 Intended Audience
- 1.5 Intended Use of the HSM
- 1.6 Context for the HSM: Use and Misuse of the Manual

Safety Management Systems

**Highway Improvement Process** 

Context Sensitive Design

- 1.7 Nature of the HSM
- 1.8 Organization of HSM

Chapter 2. Fundamentals

- 2.1 What is Safety?
- 2.2 How Road Safety is Measured

**Crash Counts** 

**Estimation Accuracy** 

Supplementary Data

Assigning Values to Crashes for Prioritization

2.3 Safety Performance Functions and Crash Modification Factors

Common Safety Performance Functions

How Crash Modification Factors are Obtained

Traffic "Exposure", Traffic Mix and Demand Management

2.4 Human Factors in Road Safety

**Driver Characteristics** 

Positive Guidance

Design Consistency

- 2.5 Speed and Safety
- 2.6 Safety Evaluation
- 2.7 User Safety Culture

## Part II - Knowledge

Chapter 3. Highway Segments

3.1 Safety Effects of Highway Design Elements

**Cross Section Elements** 

Traveled Way: Lane Width and Number of Lanes

Shoulders: Shoulder Width and Type

Curbs

Medians

Two-way Left-turn Lanes

Passing Lanes/Short Four-Lane Sections on Two-Lane Highways

Roadside Features and Elements

Roadside Safety Analysis Program

Roadside Hazard

Guardrails and Barriers

Alignment Elements

Horizontal Alignment

Vertical Alignment

**Special Features** 

## 3.2 Safety Effects of Traffic Control and other Operational Elements

Signs, Delineation, and Pavement Markings

Shoulder, Transverse, and Centerline Rumble Strips

**Speed Zoning** 

Passing on Two-Lane Roads

**On-Street Parking** 

Intelligent Transportation Systems and Traffic Management Systems

Traffic Calming

## 3.3 Pedestrian and Bicycle Safety on Highway Segments

**Bicycle Routes** 

Sidewalks

Mid-block Pedestrian Crossings

## 3.4 Safety Effects of Other Elements

Highway Lighting and Illumination

Weather Issues

Adverse Weather and Low Visibility Systems

Snow and Ice control

One-way Street Systems

#### Chapter 4. Intersections

## 4.1 Safety Effects of Intersection Design Elements

**Intersection Geometry** 

Roundabouts

Horizontal and Vertical Alignments of Intersection Approaches

Left and Right Turn Lanes and Treatments

**Auxiliary Through Lanes** 

Sight Distance

#### 4.2 Safety of Pedestrians and Cyclists at Intersections

Pedestrian Crossing Design

Crosswalk Markings

Median Refuge Islands

**Bicycle Considerations** 

Other Access Points in Close Proximity

Roadside Design

#### 4.3 Safety Effects of Intersection Traffic Control and Operation Elements

Channelization

Type of Traffic Control

**Traffic Signal Operations** 

Left Turn Operation

Right Turn Operation

Detector Placement and Signal Control on High Speed Approaches

Phase and Cycle Duration

**Actuated Control** 

Other Operational Considerations

Advance Warning Flashers

Pedestrian Traffic Control

Signing, Marking and Delineation

**Traffic Calming** 

4.4 Safety Effects of Other Intersection-Related Features

Transit Stop Placement

Illumination

**Automated Intersection Enforcement** 

Chapter 5: Interchanges

5.1 Safety Effects of Interchange Design Elements

Interchange Type/Configuration

Merge/Diverge Areas

Ramps

Ramp Terminals

Acceleration and Deceleration at Ramp Terminals

**Pedestrian Considerations** 

Other Design Elements

**Closely Spaced Intersections** 

5.2 Safety Effects of Traffic Control and Operations Elements

Traffic Control at Ramp Terminals

Ramp Metering

5.3 Safety Effects of Interchange Spacing

Chapter 6: Special Facilities and Geometric Situations

6.1 Railroad-Highway Grade Crossings

**Design Elements** 

Illumination

Alignment at Crossing [Future HSM edition]

Sight Distance [Future HSM edition]

Proximity of Highway Intersections [Future HSM edition]

Traffic Control and Operations

Choice of Advanced Traffic Control at Crossing

Traffic Control at Crossing

**Operational Decisions** 

6.2 Construction and Maintenance Work Zone Areas

Design of Elements of Work Zones

Lane Closure Merge Design

Closure Design and Centerline Treatments

Duration, Length, and Time of Day

Other Design Elements

Operations and Traffic Control

Speed Control in Work Zones

Traffic Control Devices

- 6.3 Bridges
- 6.4 High Occupancy Vehicle (HOV) Lanes/Facilities
- 6.5 Tunnels
- 6.6 Reversible Lanes
- 6.7 Weaving Areas, Collector-Distributor Roads, and Frontage Roads
- 6.8 Transit Facilities and Related Features
- 6.9 Bicycle and Pedestrian Facilities and Related Features

Chapter 7. Road Networks

- 7.1 Introduction
- 7.2 Safety in Transportation Network Planning
- 7.3 Safety in the Planning and Design of Residential Neighborhoods and

Commercial Areas

- 7.4 One-Way Systems and Turn Restrictions
- 7.5 Safety in Traffic Calming
- 7.6 Access Management

**Access Point Elements** 

**Access Point Density** 

Other Access Point Elements

- 7.7 Urban Commercial Areas
- 7.8 Transitions Between Highway Facility Types

#### **Part III – Predictive Methods**

Chapter 8. Rural, Two-Lane Roads

- 8.1 Introduction
- 8.2 Methodology
- 8.3 Applications
- 8.4 Example Problems
- 8.5 References

Appendices

Chapter 9. Rural, Multi-lane Highways

- 9.1 Introduction
- 9.2 Methodology

Overview of the Crash Prediction Algorithm

Structure of the Crash Prediction Algorithm

Calibration of the Algorithm to Local Conditions

Roadway Segments

**At-Grade Intersections** 

Predicted Crash Frequency for an Entire Project

Roadway Segments

Base Model

**Calibration Factors** 

**Crash Modification Factors** 

**At-Grade Intersections** 

Base Models

Calibration Factors

**Crash Modification Factors** 

9.3 Procedures for Application

Crash Prediction when Site-Specific Crash History Data Are Not Available

Crash Prediction when Site-Specific Crash History Data Are Available Situations in Which the EB Procedure Should and Should Not Be Applied Empirical Bayes (E-B) Procedure

- 9.4 Safety Issues Not Explicitly Addressed by the Methodology
- 9.5 Sample Calculations
- 9.6 Software for Performing Calculations
- 9.7 References

**Appendices** 

Chapter 10. Urban and Suburban Arterial Highways

10.1 Introduction

10.2 Methodology

Overview of the Crash Prediction Algorithm

Structure of the Crash Prediction Algorithm

Calibration of the Algorithm to Local Conditions

Roadway Segment

**At-Grade Intersections** 

Predicted Crash Frequency for an Entire Project

Roadway Segments

Base Model

**Calibration Factors** 

**Crash Modification Factors** 

**At-Grade Intersections** 

Base Models

**Calibration Factors** 

**Crash Modification Factors** 

10.3 Procedures for Application

Crash Prediction when Site-Specific Crash History Data Are Not

Available

Crash Prediction when Site-Specific Crash History Data Are Available Situations in Which the EB Procedure Should and Should Not Be Applied Empirical Bayes (E-B) Procedure

- 10.4 Safety Issues Not Explicitly Addressed by the Methodology
- 10.5 Sample Calculations
- 10.6 Software for Performing Calculations
- 10.7 References

**Appendices** 

#### Part IV – Safety Management of a Roadway System

Purpose

Background

Chapter 11. Identification of Sites With Promise

Chapter 12. Diagnosis of the Nature of Safety Problems at Specific Sites

Chapter 13. Selection of Countermeasures to Reduce Accident Frequency and

Severity at Specific Sites

Chapter 14. Economic Appraisal of all Sites under Consideration

# Chapter 15. Prioritize Rankings of Improvement Projects

# Part V – Safety Evaluation (include alternatives)

Chapter 16. Overview of Estimating the Safety Effect of Implemented Interventions

- 16.1 Introduction
- 16.2 Why Evaluate?
- 16.3 Data Needs and Limitations
- 16.4 Approach to Conducting A Valid Evaluation Glossary